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SITE ASSESSMENT TECHNICAL ASSISTANCE | EPA CONTRACT 68-S5-3002

12 May 2000

Mr. Mike Towle (3HS31)
On-Scene Coordinator
U.S. Environmental Protection Agency
1650 Arch Street
Philadelphia, PA 19103-2029

TDD No. 0001-90A
DCN F0000214

Subject: 12th Street Landfill Site – Trip Report

Dear Mr. Towle:

Enclosed is the 12th Street Landfill Trip Report, summarizing the results of 11-13 January 2000, 14 February 2000, and 22 February 2000 sampling events. Please feel free to contact me at (215) 238-0338, Ext. 245, regarding any aspect of this report.

Very truly yours,

ROY F. WESTON, INC.

Sviatlana Wilson
Site Leader

Attachment

cc: TDD File

SATA0303961 TripReport2

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1.0 INTRODUCTION

On 8 July 1999, the Roy F. Weston, Inc. (WESTON®), Site Assessment Technical Assistance (SATA) team was directed by U.S. Environmental Protection Agency (EPA) On-Scene Coordinator (OSC) Mike Towle to conduct a removal assessment at the 12th Street Landfill Site (Site) located in Wilmington, New Castle County, Delaware. Sampling was conducted between 26 August and 2 September 1999.

On 13 December 1999, OSC Mike Towle tasked SATA to conduct additional sampling (phase A) at the Site to aid in the ecological assessment needed to support the environmental risk assessment. Additional sediment and soil samples were collected at the Site in order to further delineate the extent of contamination on and off site.

On 26 January 2000, OSC Mike Towle again tasked SATA to conduct sampling (phase B) at the Site to aid in the ecological assessment needed to support the environmental risk assessment. Additional sediment samples were collected near the Site in order to further delineate the extent of contamination on and off site. Soil samples were collected for bio-assay analysis. The soil bio-assay analytical results were used to support the EPA's decision to use a specific type of erosion control measure along the stream bank depending on the toxicity results.

This trip report summarizes the findings for the 11-13 January 2000, 14 February 2000, and 22 February 2000 sampling events.

2.0 BACKGROUND

2.1 Location

The Site is located in Wilmington, New Castle County, Delaware, as seen in Figure 1, Site Location Map (Reference 1). The approximate site coordinates are 39° 44' 15" north latitude and 75° 31' 35" west longitude (Reference 2).

2.2 Site Description

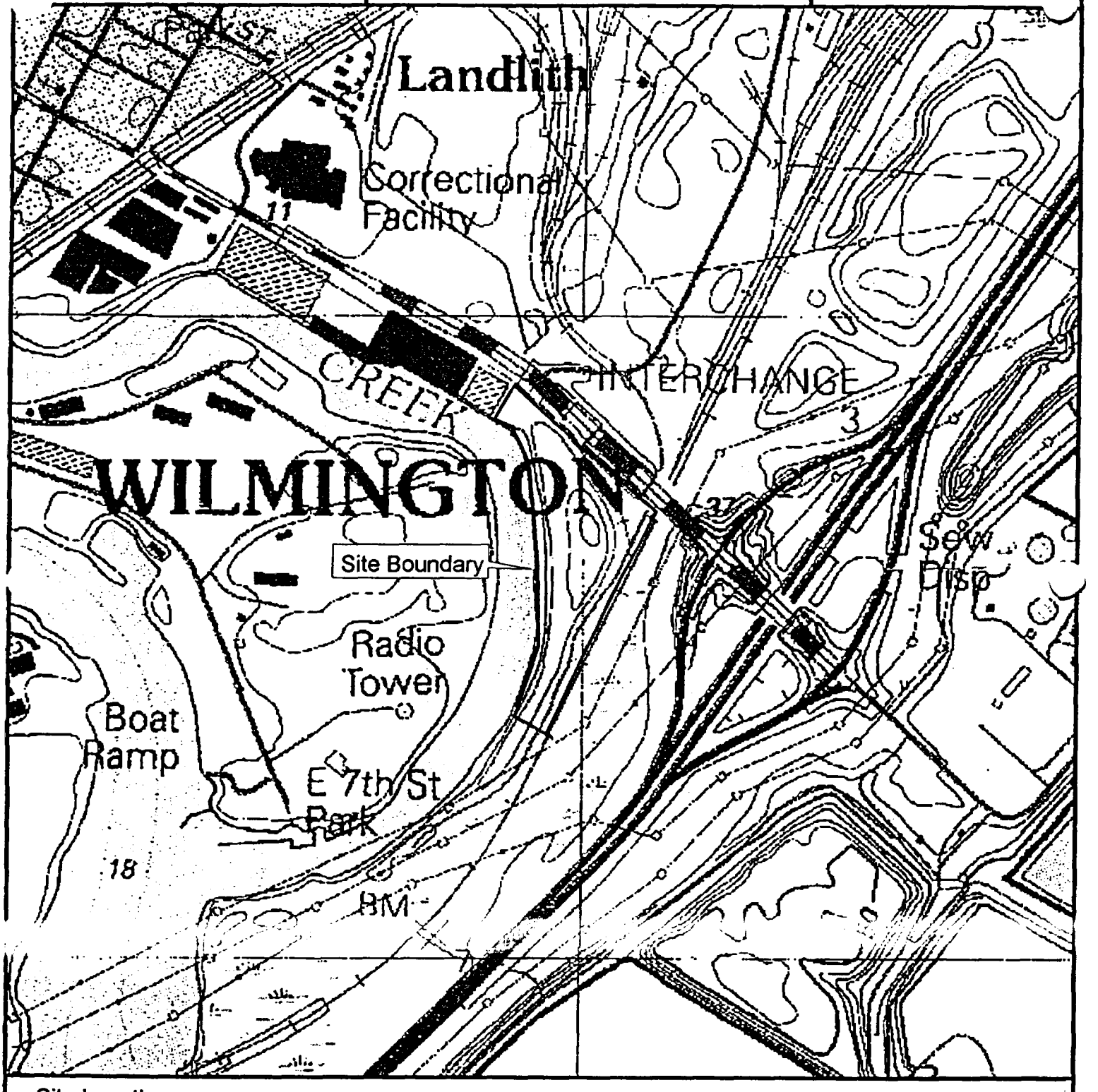
The 12th Street Landfill Site is located in an industrial area on 12th Street, west of the Interstate-495 12th Street ramp, near Gander Hill Prison in Wilmington, New Castle County, Delaware. The Site consists of two land parcels. Parcel 19 (which contains the area of concern) is bordered to the west by Brandywine Creek, to the north by Asset Recovery Services, and to the east and south by state of Delaware owned land (parcel 14). Parcel 14 is bordered to the north by Gander Hill Prison, to the northeast by a Norfolk & Southern railroad yard, to the east and southeast by Norfolk & Southern railroad tracks (Shellpot Branch), and to the west by the Brandywine Creek and parcel 19 (see Figure 2, Site Plan) (Reference 3).

WESTON FEDERAL PROGRAMS DIVISION
MANAGERS DESIGNERS/CONSULTANTS

12th Street Landfill Site

Wilmington, DE

TDD No. 0001-0090A
Contract No. 68-S5-3002



Site Location

Figure 1
Site Location Map

Source: USGS 7.5 Minute Topographic Quadrangles
Wilmington South, DE- NJ, 1993

Julius Wemman previously owned parcel 19 until 1926. Between 1926 and 1930 the parcel was owned by the mayor and council of Wilmington. The Wilmington Economic Development Corporation owned the parcel from 1930 to 1987. This parcel is presently owned by the city of Wilmington. George W. Talley previously owned parcel 14 until 1887. Between 1887 and 1971, the parcel was owned by the Philadelphia, Baltimore, and Washington Rail Road Company. This parcel is presently owned by the state of Delaware Department of Transportation. There is no information on what the parcels were utilized for during previous ownerships. Apparently, the area of concern (AOC) was utilized as an unauthorized dump site, in which at least 14 55-gallon drums, rubber hoses, slag, and a light colored ash-like material were disposed of on the property (Reference 3). The company suspected of dumping, Electric Hose and Rubber, operated out of the Brandywine Industrial Complex located adjacent to the Site and ceased operations in 1977 (Reference 4).

The Site is relatively flat, with an average elevation of approximately 10 feet above sea level. The AOC is bounded to the west by the Brandywine Creek, which flows into the Christina River downstream of the Site. The Brandywine Creek has its headwater in the Piedmont Plateau in Pennsylvania, which defines the border between Chester County and Delaware County in Pennsylvania and enters Delaware just north of Beaver Valley. The creek meanders through Wilmington until it joins the Christina River which then joins the Delaware River southeast of Wilmington (Reference 5). The site is located adjacent to the tidally influenced part of the Brandywine Creek. The mean tide in the area is about 2.84 feet, with the mean range between high and low tide of 5.30 feet. Mean Higher High Water (MHHW) in the area is approximately 5.78 feet (Reference 6). The water supply for the Wilmington area is obtained from a surface water intake located 4,800 feet upstream of the Site along the Brandywine Creek (Reference 7).

During the removal assessment, both parcels were covered with thick vegetation consisting of tall phragmites and deciduous trees. Two drum cluster areas were identified. One drum cluster area is located in the northwestern area of parcel 19 adjacent to the Brandywine Creek (northwest side of the AOC). The second drum cluster area is located in the center of parcel 19 (southern side of the AOC).

2.3 Geologic Setting

The Geology of the Wilmington Area, Delaware Geologic Map Series Number 4 geologic map prepared by the Delaware Geologic Survey indicates that the 12th Street Landfill Site is located on the border of the Piedmont Physiographic Province and the Atlantic Coastal Plain. The contact, referred to as the fall line, is located approximately 2,000 feet north of the 12th Street Landfill Site (Reference 5).

The bedrock at the Site consists of metaigneous and metasedimentary rocks of the Wilmington Complex. The composition is primarily hypersthene-quartz-andesine gneiss with minor amounts of biotite and magnetite. Regolith overlying the bedrock of the area reportedly varies from 0-20 feet (Reference 5).

The unconsolidated aquifer overlying the bedrock generally forms at the base of the regolith, directly above the unweathered bedrock. The aquifer typically acts as an unconfined aquifer. The piedmont aquifers are complex and unpredictable due to the variability of fractures. The rock units of the Piedmont are relatively impermeable, except where weathering or fracturing has taken place (Reference 5).

Due to the variability of the regolith thickness and its limited vertical extent in the vicinity of the site, water yields are expected to be low. Groundwater at the site is tidal influenced. During the removal assessment, water levels in the test pits ranged between approximately 7 to 8 feet below ground surface (bgs) in the central and southern sections of the AOC to approximately 13 feet bgs in the northwestern section of the AOC. One test pit (18 feet deep) in the northern section of the AOC did not encounter any groundwater.

There are no public supply or private home wells that are used for either domestic or potable purposes located within four miles of the Site (Reference 7).

2.4 Climatic Setting

The annual average temperature in Wilmington is 54.6°F. The average monthly temperatures range from 35°F in January to 76°F in July. The average annual precipitation for Wilmington is 44.38 inches. The average monthly precipitation ranges from 2.72 inches in February to 5.34 inches in August. The mean annual lake evaporation for the area of the site is approximately 35 inches. The net annual precipitation for the site is approximately 9.38 inches. A two-year, 24-hour rainfall will produce approximately 3.3 inches of rain (Reference 8).

2.5 Regulatory History

During 14-16 June 1999, Delaware Department of Natural Resources and Environmental Control [illegible] conducted a Brownfields Site Assessment Investigation for the eastern side of the Brandywine Creek, along 12th Street. During this site visit, DNREC collected surface soil samples on the Site. On 7 July 1999, DNREC updated city officials on their findings (Reference 4).

In July 1999, the EPA was notified by DNREC to investigate what appeared to be drums containing hazardous materials at the Site.

In late August and early September 1999, OSC Towle began conducting a removal assessment of the property to determine if further federal actions were warranted at the 12th Street Landfill Site.

3.0 SITE ACTIVITIES

During 11-13 January 2000, additional samples (phase A) were collected at the 12th Street Landfill Site. Twenty-eight surface soil samples (excluding duplicates) were collected within the AOC, located on parcel 19, and off the Site. Nine subsurface soil samples (excluding duplicates) were collected within the AOC. Thirty-two sediment samples (excluding duplicates) were collected from the eastern edge (mudflat) of the Brandywine Creek adjacent to the Site. Sample locations are illustrated on Figure 3, Environmental Sample Location Plan. All of the samples collected were analyzed by the DNREC X-ray fluorescence (XRF) instrument. In addition, 20% of the samples (randomly chosen) were analyzed for lead by a Contract Laboratory Program (CLP) for confirmation and 10 randomly chosen samples were analyzed for Target Analyte List (TAL) metals and Target Compound List (TCL) semivolatiles. SATA members Paul Davis, Myles Bartos, and Eric Bailey conducted the field work and sampling. OSC Mike Towle was also on site during the field activities.

On 14 February 2000, additional samples (phase B) were collected at the Site. Five soil samples (0 to 12-inch depth) were collected at the Site for bio-assay analysis. On 22 February 2000 (also phase B), 20 sediment samples were collected from the eastern edge (mudflat) of the Brandywine Creek adjacent to the Site. SATA members Paul Davis and Jason Petracci conducted the field work and sampling. OSC Mike Towle was also on site during the field activities.

3.1 Site Conditions and Observations

Weather conditions during the phase A sampling event on 11 and 12 January were cool, with temperatures between 40°F and 45°F, and partly sunny skies. Weather conditions on 13 January were cool, with temperatures between 40°F and 45°F, and light to moderate rain. Weather conditions during the phase B sampling event on 14 February 2000 were cool, with temperatures between 40°F to 45°F, and light to moderate rain. Weather conditions on 22 February were sunny, cool, with temperatures in the low 50°F, and breezy. The Brandywine Creek was covered with thick ice during the 14 February sampling event, which impeded the sediment sampling activities.

3.2 Sampling Activities

During the first phase of the additional sampling in mid January surface soil sample locations were set up on a grid within the AOC, as outlined in the SATA 12th Street Landfill Site Sampling Plan (Reference 9). The grid nodes were set at 100-foot spacings north to south and 50-foot spacings west to east. Twenty surface soil samples were collected within the AOC. Three surface soil samples were collected south of the AOC each 100 feet apart. Two surface soil samples

were collected 200 feet apart south of the previously mentioned locations and three surface soil samples were collected 100 feet east of the AOC. Eight subsurface soil samples were collected within the AOC and one subsurface soil sample was collected east of the AOC. The subsurface soil samples were located at the same locations as the surface soil samples and were randomly picked. Thirty two sediment samples were collected from the eastern edge (mudflat) of the Brandywine Creek adjacent to the Site. The sediment sample locations were collected at spacing intervals of 50 feet along the eastern side of the Creek, during low tide. The sample locations were staggered to eliminate any large gaps between the locations.

On 14 February and 22 February 2000, additional samples (phase B) were collected at the Site. Five soil samples (0 to 12 inches) were collected on and off the Site. The soil samples were collected from previous soil sample locations in the area of concern and collected from the locations that ranged from the lowest to the highest lead results. A sample was also collected and used as a background sample. The soil samples were analyzed for 14-day acute test on earthworms (bio-assay parameter) as well as TAL metals, TCL semivolatiles, and pesticides/polychlorinated biphenyls (PCBs).

Twenty sediment samples were collected from the eastern edge (mudflat) between the creek bank and the riprap line along the eastern side of the Brandywine Creek, adjacent to the Site. The sediment sample locations were located at previous sediment sample locations and biased toward the locations with elevated lead results. A sample was obtained from a depth of 6 inches and 12 inches at each location. The sediment samples were analyzed by the DNREC XRF instrument. In addition to the sample collection, another objective of the sediment sampling was to determine the thickness of the sediment deposits over the mudflat layer.

Laboratory quality assurance and quality control samples were collected during the phase A sampling event as well as one field blank sample and one rinsate blank sample. See Attachment 2, Sample Log Sheets, for sample descriptions.

All samples were handled and packaged in accordance with the sampling plans. The phase A sampling event organic samples were shipped via Federal Express to Envirosystems, Inc. in Columbia, Maryland for analysis. The phase A inorganic samples were shipped via Federal Express to Severn Trent Laboratories in Broken Arrow, Oklahoma for analysis. The phase B sampling event organic and inorganic samples were shipped via Federal Express to Compuchem Laboratory in Cary, North Carolina. The soil bio-assay samples were shipped via Federal Express to Envirosystems, Inc. located in Hampton, New Hampshire.

4.0 ANALYTICAL RESULTS

Table 1, Industrial Soil Risk-Based Concentrations (RBC) Exceedances, summarizes all of the compounds that exceeded industrial soil RBCs and their location for surface and subsurface soil samples (Reference 10).

Table 1
Industrial Soil RBC Exceedances

Chemical	RBC	TS-SS-08	TS-SS-09	TS-SS-10	TS-SS-12	TS-SS-13	TS-SS-15	TS-SS-17
Arsenic	3.8	107	50.2	86.5	23.5	47.7	86.9	105
Chromium	613.2	---	---	759 J	---	---	---	---
Iron	61,000	64,800	---	---	---	77,800 J	98,100 J	112,000 J
Lead	400	6,890 J	33,500 J	9,330 J	7,780 J	3,660	1,690	7,790

Chemical	RBC	TS-SS-18	TS-SS-21	TS-SS-24	TS-SS-34	TS-SS-35	TS-SS-36	TS-SS-37
Arsenic	3.8	93.7	83.6	12.2	73.9	114	18.9	17.4
Chromium	613.2	---	---	---	---	---	---	---
Iron	61,000	100,000 J	102,000 J	---	61,700	75,000	---	---
Lead	400	3,970	2,400	521	7,350	13,400	22,600	566

Chemical	RBC	TS-SB-08	TS-SB-12	TS-BG-02	TS-BG-03	TS-BG-04	TS-FD-02
Arsenic	3.8	60.7	17.7	8.5	5.3	13.8	71.6
Chromium	613.2	---	---	---	---	---	---
Iron	61,000	---	---	---	---	---	82,800
Lead	400	22,300	---	---	---	---	73,000

All units are in mg/kg.
--- = Not detected.
J = Analyte present. Reported value may not be accurate or precise.
TS-FD-02 is a field duplicate of sample TS-SS-09.

Arsenic exceeded its RBC in 20 soil samples including one duplicate (Reference 9). There is no RBC for lead in soil. The value of 400 mg/kg was used for comparison purposes and is based on the EPA residential soil screening value. Lead exceeded its screening value in 16 soil samples. Nine soil samples showed levels of iron higher than the RBC for that compound. Levels of chromium were higher than the RBC in one soil sample.

Table 2, Industrial Sediment RBC Exeedances, summarizes all compounds exceeding RBC levels and their locations. Two sediment samples showed levels of arsenic higher than those recommended by industrial RBCs (Reference 10).

Table 2
Industrial Sediment RBC Exceedances

Chemical	RBC	TS-SED-11	TS-SED-23
Arsenic	38	62.1 J	56.9 J

All units are in mg/kg.
J = Analyte present. Reported value may not be accurate or precise.

Due to existing boat traffic and recreational use of the Brandywine Creek, all sediment samples were also compared to residential RBCs. Table 3 summarizes locations and levels of concentrations exceeding residential RBCs.

Table 3
Residential Sediment RBC Exceedances

	RBC	TS-SED-07	TS-SED-10	TS-SED-11	TS-SED-14	TS-SED-15	TS-SED-17
Arsenic	4.3	23	9.5	62	4.6	6.7	9.7

	RBC	TS-SED-18	TS-SED-19	TS-SED-23	TS-SED-27	TS-SED-28	TS-SED-29
Arsenic	4.3	29.2	4.7	56.9	11	9.7	9.2

All units are in mg/kg.

All of the sediment sample locations showed elevated levels of arsenic, exceeding recommended RBCs (Reference 10). None of the surface soil, subsurface soil, or sediment samples exceeded any of the ERG values (Reference 10).

Table 4 summarizes results of the evaluation of toxicity of soil samples to the earthworm (*Eisenia foetida*).

Table 4
Toxicity Evaluation Summary

Compound	SS-34	SS-35	SS-36	SS-37	BG-04
Mean Survival (%)	72	72	84	85	83

Laboratory control for these samples had a 93% survival rate. This result might suggest that contaminant toxicity is responsible for elevated mortality levels in soil samples. However, laboratory control soil was significantly different from that collected on the site location, and therefore survival rates should be compared with caution. Background sample BG-04 was collected on site and is representative in terms of soil characteristics. When compared to the background sample, survival rates are not significantly different in BG-04 and four soil samples.

Toxicity results can be correlated with analytical data for concentrations of contaminants at each location. It was observed that increasing mortality occurred in locations with elevated levels of arsenic and chromium, while lead and copper, even at high

5.0 FUTURE ACTIONS/RECOMMENDATIONS

Following a review of the analytical results and consultation with EPA's ecological risk assessment experts and WESTON design group, the OSC will approve means of site and river bank stabilization.

6.0 REFERENCES

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5. WIK Associates Inc. 1996. *Remedial Investigation Report Diamond State Salvage.* Wilmington, DE. August.

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7. Daily Tide and Current Predictions. 2000. [online]. Tide – Christina River, Delaware, Millside RR Bridge. [www.tides.com][cited 10 May 2000].

8. NOAA (National Oceanic and Atmospheric Administration). 1993. *Climatic Atlas of the United States.* Asheville, NC.

9. Roy F. Weston, Inc. Site Assessment Technical Assistance. 1999. *12th Street Landfill Site Sampling Plan.* Delran, NJ. 22 December.

10. U.S. Environmental Protection Agency. 1999. *EPA Region III Risk-Based Concentration Table.* Philadelphia, PA. 7 October.

ATTACHMENTS: 1 – Sample Log Sheets
2 – Sample Data Summary
3 – Photograph Log